

CLAIMS

What is claimed is:

1. A rearview mirror assembly for a vehicle, comprising:
 - a mirror subassembly including a mirror housing and adapted to be attached to the vehicle;
 - a mirror mounted in said mirror housing;
 - a first microphone housing having at least one acoustic port and associated with said mirror subassembly;
 - a first transducer disposed in said first microphone housing and acoustically coupled to said acoustic port of said first microphone housing;
 - a first windscreens disposed across said acoustic port of said first microphone housing;
 - a second microphone housing having at least one acoustic port and associated with said mirror subassembly;
 - a second transducer disposed in said second microphone housing and acoustically coupled to said acoustic port of said second microphone housing; and
 - a second windscreens disposed across said acoustic port of said second microphone housing.
2. The rearview mirror assembly of claim 1, wherein the acoustic ports of said first and second microphone housings are configured differently.
3. The rearview mirror assembly of claim 1, wherein said microphone housings and windscreens are configured to compensate for the effect said mirror has on the sensitivity of said transducers.
4. The rearview mirror assembly of claim 1, wherein the acoustic resistivity of said first and second windscreens is at least about 1 acoustic Ω/cm^2 .
5. The rearview mirror assembly of claim 1, wherein said first and second windscreens have different acoustic resistivity.

6. The rearview mirror assembly of claim 1, wherein said first windscreens is sealed across the acoustic port of said first microphone housing, and said second windscreens is sealed across the acoustic port of said second microphone housing, said windscreens having hydrophobic properties to prevent water from penetrating said microphone housings through said acoustic ports.

7. The rearview mirror assembly of claim 1 and further including a mechanical structure disposed between said first and second transducers to increase the acoustic path length between said first and second transducers.

8. The rearview mirror assembly of claim 1 and further including a first circuit board having a hole sized to receive at least a portion of said first transducer, wherein said first transducer is mounted within the hole in the first circuit board such that a portion of said first transducer extends below a bottom surface of said first circuit board.

9. The rearview mirror assembly of claim 1, wherein said mirror is an electrochromic mirror.

10. The rearview mirror assembly of claim 1, wherein said first and second transducers include a front and a rear surface, wherein said front surfaces are acoustically coupled to respective said acoustic ports in said microphone housings.

11. The rearview mirror assembly of claim 1, wherein said microphone housings have at least two acoustic ports and wherein said windscreens are sealed across said acoustic ports.

12. The rearview mirror assembly of claim 11, wherein said first and second transducers each include a front and a rear surface, wherein said front surface of said first transducer is acoustically coupled to a first one of said acoustic ports in said first microphone housing, said rear surface of said first transducer is acoustically coupled to a second one of said acoustic ports of said first microphone housing, said front surface of said second transducer is acoustically

coupled to a first one of said acoustic ports in said second microphone housing, and said rear surface of said second transducer is acoustically coupled to a second one of said acoustic ports of said second microphone housing.

13. The rearview mirror assembly of claim 1, wherein said first transducer includes a first transducer housing having at least one port, and said second transducer includes a second transducer housing having at least one port.

14. The rearview mirror assembly of claim 13, wherein said first transducer is positioned in said first microphone housing such that said at least one port of said first transducer housing is spaced apart from said first windscreens, and said second transducer is positioned in said second microphone housing such that said at least one port of said second transducer housing is spaced apart from said second windscreens.

15. The rearview mirror assembly of claim 13, wherein:

 said at least one acoustic port in said first microphone housing includes at least one front acoustic port and at least one rear acoustic port;

 said first windscreens are disposed across said front and rear acoustic ports of said first microphone housing;

 said at least one port in said first transducer housing includes at least one front port and at least one rear port;

 said at least one front port of said first transducer housing is acoustically coupled to said at least one front acoustic port of said first microphone housing; and

 said at least one rear port of said first transducer housing is acoustically coupled to said at least one rear acoustic port of said first microphone housing.

16. The rearview mirror assembly of claim 15, wherein said first microphone housing defines a common cavity to which both said front and rear ports of said first transducer housing are acoustically coupled.

17. The rearview mirror assembly of claim 15, wherein:

 said at least one acoustic port in said second microphone housing includes at least one front acoustic port and at least one rear acoustic port;

 said second windscreens are disposed across said front and rear acoustic ports of said second microphone housing;

 said at least one port in said second transducer housing includes at least one front port and at least one rear port;

 said at least one front port of said second transducer housing being acoustically coupled to said at least one front acoustic port of said second microphone housing; and

 said at least one rear port of said second transducer housing being acoustically coupled to said at least one rear acoustic port of said second microphone housing.

18. The rearview mirror assembly of claim 1, wherein said acoustic ports in said first and second microphone housings each include at least one front acoustic port and at least one rear acoustic port, and wherein said first and second microphone housings define common cavities to which both said front and rear acoustic ports of each of said first and second microphone housings are acoustically coupled.

19. An accessory for a vehicle, comprising:

 an accessory housing adapted for mounting to the vehicle;

 a first microphone housing having at least one acoustic port and mounted on said accessory housing;

 a first transducer disposed in said first microphone housing and acoustically coupled to said acoustic port of said first microphone housing;

 a first windscreens disposed across said acoustic port of said first microphone housing;

 a second microphone housing having at least one acoustic port and mounted on said accessory housing;

 a second transducer disposed in said second microphone housing and acoustically coupled to said acoustic port of said second microphone housing; and

 a second windscreens disposed across said acoustic port of said second microphone housing.

20. The vehicle accessory of claim 19, wherein the acoustic ports of said first and second microphone housings are configured differently.
21. The vehicle accessory of claim 19, wherein said first and second windscreens have different acoustic resistivity.
22. The vehicle accessory of claim 19, wherein the acoustic resistivity of said first and second windscreens is at least about 1 acoustic Ω/cm^2 .
23. The vehicle accessory of claim 19, wherein said first windscreens is sealed across the acoustic port of said first microphone housing, and said second windscreens is sealed across the acoustic port of said second microphone housing, said windscreens having hydrophobic properties to prevent water from penetrating said microphone housings through said acoustic ports.
24. The vehicle accessory of claim 19 and further including a mechanical structure disposed between said first and second transducers to increase the acoustic path length between said first and second transducers.
25. The vehicle accessory of claim 19 and further including a first circuit board having a hole sized to receive at least a portion of said first transducer, wherein said first transducer is mounted within the hole in the first circuit board such that a portion of said first transducer extends below a bottom surface of said first circuit board.
26. A microphone assembly comprising:
 - a first housing having at least one acoustic port;
 - a first transducer disposed in said first housing and acoustically coupled to said acoustic port of said first housing;
 - a first windscreens disposed across said acoustic port of said first housing;
 - a second housing having at least one acoustic port;

a second transducer disposed in said second housing and acoustically coupled to said acoustic port of said second housing; and

a second windscreens disposed across said acoustic port of said second housing.

27. The microphone assembly of claim 26, wherein the acoustic ports of said first and second microphone housings are configured differently.

28. The microphone assembly of claim 26, wherein said first and second windscreens have different acoustic resistivity.

29. The microphone assembly of claim 26, wherein the acoustic resistivity of said first and second windscreens is at least about 1 acoustic Ω/cm^2 .

30. The microphone assembly of claim 26, wherein said microphone housings are mounted on a vehicle rearview mirror assembly.

31. The microphone assembly of claim 26, wherein said microphone housings are mounted on a mirror housing of a rearview mirror assembly having a mirror.

32. The microphone assembly of claim 31, wherein said microphone housings and windscreens are configured to compensate for the effect the mirror has on the sensitivity of said transducers.

33. The microphone assembly of claim 26 and further including a mechanical structure disposed between said first and second transducers to increase the acoustic path length between said first and second transducers.

34. The microphone assembly of claim 26 and further including a first circuit board having a hole sized to receive at least a portion of said first transducer, wherein said first transducer is mounted within the hole in the first circuit board such that a portion of said first transducer extends below a bottom surface of said first circuit board.

35. The microphone assembly of claim 26, wherein said first windscreens is sealed across the acoustic port of said first microphone housing, and said second windscreens is sealed across the acoustic port of said second microphone housing, said windscreens having hydrophobic properties to prevent water from penetrating said microphone housings through said acoustic ports.

36. The microphone assembly of claim 35, wherein said windscreens are adhesively attached to the underside of said microphone housings so as to extend across said acoustic ports.

37. The microphone assembly of claim 35 and further comprising a circuit board, wherein said first transducer is mounted to said circuit board and said first microphone housing is tightly bonded about said circuit board to provide a water-impervious enclosure for said first transducer.

38. The microphone assembly of claim 35, wherein said windscreens are molded integrally across said acoustic ports of said microphone housings.

39. The microphone assembly of claim 35, wherein said windscreens are made of cloth.

40. The microphone assembly of claim 26, wherein said first and second transducers include a front and a rear surface, wherein said front surfaces are acoustically coupled to respective said acoustic ports in said microphone housings.

41. The microphone assembly of claim 26, wherein said microphone housings have at least two acoustic ports and wherein said windscreens are sealed across said acoustic ports.

42. The microphone assembly of claim 41, wherein said first and second transducers each include a front and a rear surface, wherein said front surface of said first transducer is acoustically coupled to a first one of said acoustic ports in said first microphone housing, said rear surface of said first transducer is acoustically coupled to a second one of said acoustic ports of said first microphone housing, said front surface of said second transducer is acoustically coupled to a first one of said acoustic ports in said second microphone housing, and said rear

surface of said second transducer is acoustically coupled to a second one of said acoustic ports of said second microphone housing.

43. The microphone assembly of claim 26, wherein said first transducer includes a first transducer housing having at least one port, and said second transducer includes a second transducer housing having at least one port.

44. The microphone assembly of claim 43, wherein said first transducer is positioned in said first microphone housing such that said at least one port of said first transducer housing is spaced apart from said first windscreens, and said second transducer is positioned in said second microphone housing such that said at least one port of said second transducer housing is spaced apart from said second windscreens.

45. The microphone assembly of claim 43, wherein:

 said at least one acoustic port in said first microphone housing includes at least one front acoustic port and at least one rear acoustic port;
 said first windscreens are disposed across said front and rear acoustic ports of said first microphone housing;

 said at least one port in said first transducer housing includes at least one front port and at least one rear port;

 said at least one front port of said first transducer housing is acoustically coupled to said at least one front acoustic port of said first microphone housing; and

 said at least one rear port of said first transducer housing is acoustically coupled to said at least one rear acoustic port of said first microphone housing.

46. The microphone assembly of claim 45, wherein said first microphone housing defines a common cavity to which both said front and rear ports of said first transducer housing are acoustically coupled.

47. The microphone assembly of claim 45, wherein:

 said at least one acoustic port in said second microphone housing includes at least one front acoustic port and at least one rear acoustic port;

 said second windscreens are disposed across said front and rear acoustic ports of said second microphone housing;

 said at least one port in said second transducer housing includes at least one front port and at least one rear port;

 said at least one front port of said second transducer housing is acoustically coupled to said at least one front acoustic port of said second microphone housing; and

 said at least one rear port of said second transducer housing is acoustically coupled to said at least one rear acoustic port of said second microphone housing.

48. The microphone assembly of claim 26, wherein said acoustic ports in said first and second microphone housings each include at least one front acoustic port and at least one rear acoustic port, and wherein said first and second microphone housings define common cavities to which both said front and rear acoustic ports of each of said first and second microphone housings are acoustically coupled.